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IS 4918 (1981): Hard Metal (Carbide) Wire, Bar and Tube Drawing Dies [PGD 4: Metal Forming Machines]

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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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Indian Standard

SPECIFICATION FOR
HARD METAL (CARBIDE) WIRE, BAR AND
TUBE DRAWING DIES

(First Revision)

1. Scope — Covers the dimensions and requirements for hard metal dies for drawing ferrous and non-ferrous round and shaped wires, bars and tubes, having code letters of application (A to F, L, N, R and S).

1.1 The comparison of bearing and bore dimensions for various types of drawing dies is given in Appendix A.

1.2 The dimensions of hard metal rough pellets intended to be used in dies having code letters of application A to F shall be according to IS : 9888-1981 'Dimensions for sintered pellets of hard metal (carbide) for wire, bar and tube drawing dies.'

2. Code-Letters of Application

2.1 *For Wires, Bar and Tube Dies*

A — Wire drawing dies for steel

B — Wire drawing dies for non-ferrous metal

C — Bar drawing dies for steel

D — Bar drawing dies for non-ferrous metal

E — Tube drawing dies for steel

F — Tube drawing dies for non-ferrous metal

L — Shaped drawing dies for steel of square and flat section

N — Shaped drawing dies for non-ferrous metal of square and flat section

R — Hexagon bar drawing dies for steel

S — Hexagon bar drawing dies for non-ferrous metal

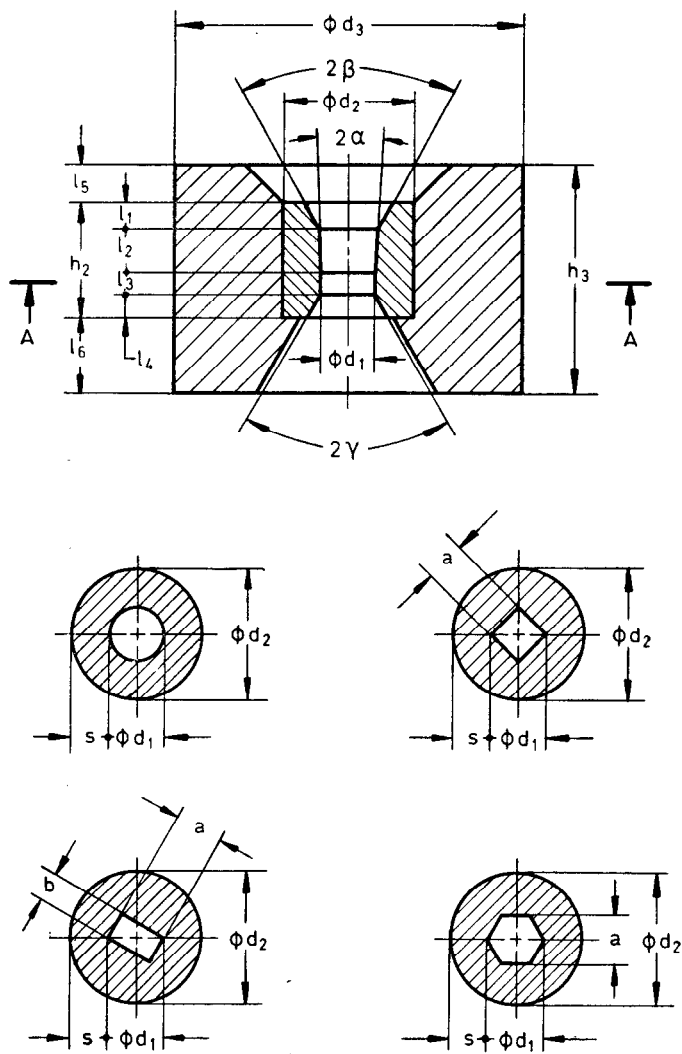**2.2** *For the Shape of Cases*

Z — Cylindrical shape

K — Conical shape

Adopted 24 July 1981   © January 1982, ISI   Price Rs 10·00   Gr 6

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

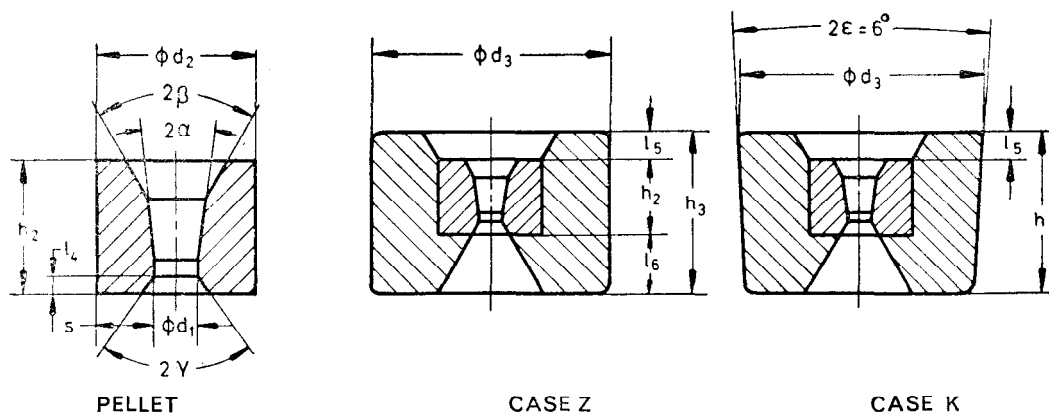## 3. Terminology — Shall be as explained in figure below:

SECTION A A

d_1 = diameter of bearing

d_2 = diameter of pallet

d_3 = diameter of case

h_2 = height of pallet

h_3 = height of case

l_1 = length of entry angle

l_2 = length of drawing angle

l_3 = length of bearing

l_4 = length of exit angle

l_5 = length of entry opening of the case

l_6 = length of exit angle of the case

s = wall thickness of the pallet

$a \times b$ = bore dimensions across flat, $a > b$

2α = drawing angle

2β = angle of entry cone

2γ = exit angle

4. Dimensions — Shall be as given in **4.1, 4.2, 4.3, 4.4, 4.5** and **4.6.**

4.1 *Dimensions for Wire Drawing Dies for Steel (Code-Letter A) and Wire Drawing Dies for Non-ferrous Metal (Code-Letter B)*

PELLET CASE Z CASE K

All dimensions in millimetres.

Pellet											Case			
		Form A			Form B									
d_2	h_2	d_1		s^*	d_1		s^*	l_4	2β	2γ	d_3	h_3	l_5	l_6‡
		Min	Max	Min	Min	Max	Min	Max						
8	4	0·1	1	3·5	0·1	1·5	3·25	1	90°	90°	28	12	3	5
10	8	0·2	2	4	0·2	2·5	3·75	2			28	16		5
12	10	0·3	3	4·5	0·3	3·5	4·25	2·5				20		7
14	12	0·4	4	5	0·4	4·5	4·75	3	60°	75°	28†/43	22	3	7
16	13	0·5	5	5·5	0·5	6	5	3·5			43	25	4	8
20	17	1·5	6·5	6·75	1·5	8	6	4 5			43	32		
25	20	2·5	9	8	2·5	10·5	7·25	5	60°	60°	53/75†	35	5	10
30	24	3·5	12	9	3·5	13	8·5	6			75	40	6	

Note 1 — d_{1Min} = minimum and preferable diameter of bearing at the first application.

Note 2 — d_{1Max} = maximum diameter of bearing which is recommended for drawing steel wire having a tensile strength up to 900 MPa [1 MPa = 0·1 kgf/mm^2 (approx)] in the drawn condition and for drawing wires of non-ferrous metal having a tensile strength up to 600 MPa in the drawn condition.

Note 3 — The diameter of bearing d_1 required by the user should be chosen within the limits d_{1Max} and d_{1Min}. The tolerance of bearing shall be specified by the user.
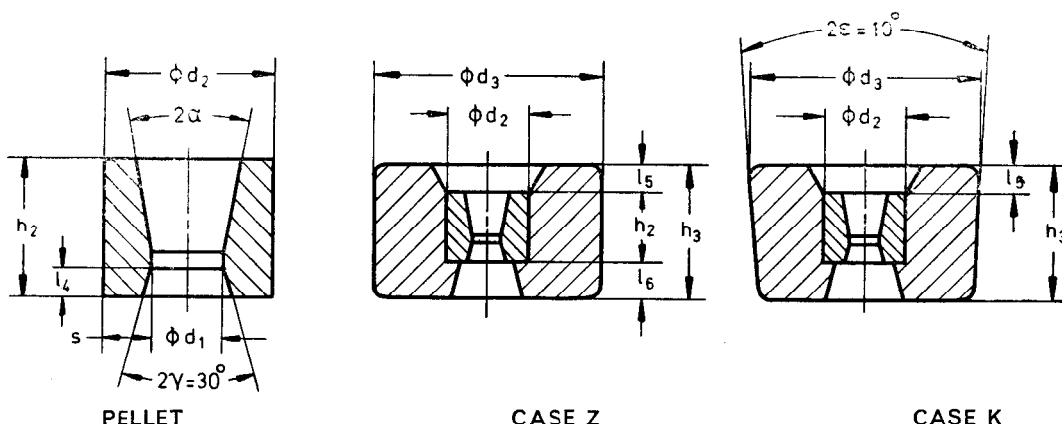
Note 4 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\varepsilon = 6°$ shall be provided, in which event d_3 is the diameter of the larger end of the taper.

$$*s_{Min} = \frac{d_2 - d_{1Max}}{2}.$$

†The value 28 instead of 43 is more particularly recommended for wire drawing of copper wire. The value 75 instead of 53 is more recommended for wire drawing of steel wires of higher resistance.

‡Only for information.

3

4.2 *Dimensions for Bar Drawing Dies for Steel (Code-Letter C)*

PELLET   CASE Z   CASE K

All dimensions in millimetres.

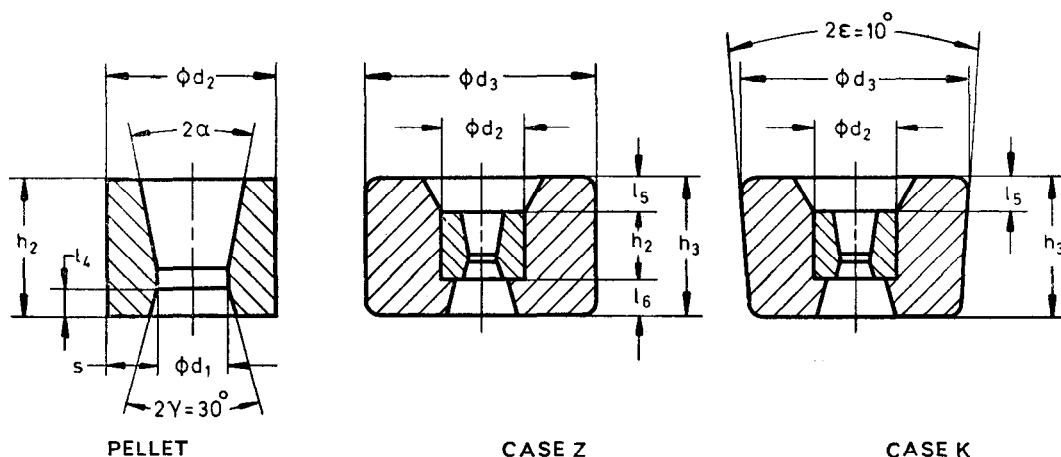| Pellet							Case					
d_2	h_2	d_1		s^*	l_4†		d_3	h_3	l_5		l_6‡	
		Min	Max	Min	Min	Max			Min	Max	Min	Max
30		9	13	8·5								
35	24	12	16	9·5	2·4	4·8	100	45	5	9	12	16
40		15	19	10·5								
45	25	18	22	11·5	2·5	5·0	100	50	5	9	16	20
50		21	25	12·5								
							150					
55	27	24	28	13·5	2·7	5·4		55			19	23
60	27	27	31	14·5	2·7	5·4	150	55	5	9	19	23
65		29	34	15·5								
70	30	32	37	16·5	3·0	6·0		60			21	25
75	30	35	41	17·0	3·0	6·0	150	60	5	9	21	25
80		39	45	17·5			200					
85	33	43	49	18·0	3·3	6·6		65			23	27
90	33	47	53	18·5	3·3	6·6	200	65	5	9	23	27
100	35	51	61	19·5	3·5	7·0					21	25

Note 1 — d_{1Min} = minimum and preferable diameter of bearing at the first application.

Note 2 — d_{1Max} — maximum diameter of bearing which is recommended for drawing steel bars having a tensile strength up to 800 MPa in the drawn condition with a drawing angle 2α up to and including 25°.

Note 3 — Dies for drawing non-ferrous metal bars with d_{1Max} exceeding 72 mm are outside the scope of this International Standard.

Note 4 — The diameter of bearing d_1 required by the user shall be chosen within the limits d_{1Max} and d_{1Min} except when the drawing angle 2α exceeds 20°. The tolerance of bearing shall be specified by the user.

Note 5 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\varepsilon = 10°$ shall be provided, in which event d_3 is the diameter of the larger end of the taper.

Note 6 — For use on multiple draw benches a case diameter d_3 of 125 mm may be supplied for pellet diameter d_2 of 50 and 55 mm and a case diameter d_3 of 175 mm for pellet diameter d_2 of 80 and 85 mm.

$^*s_{Min} = \dfrac{d_2 - d_{1Max}}{2}$.

†$l_4 = 0·1$ up to $0·2\ h_2$.

‡Only for information.

4.3 *Dimensions for Bar Drawing Dies for Non-ferrous Metal (Code-Letter D)*

PELLET   CASE Z   CASE K

All dimensions in millimetres.

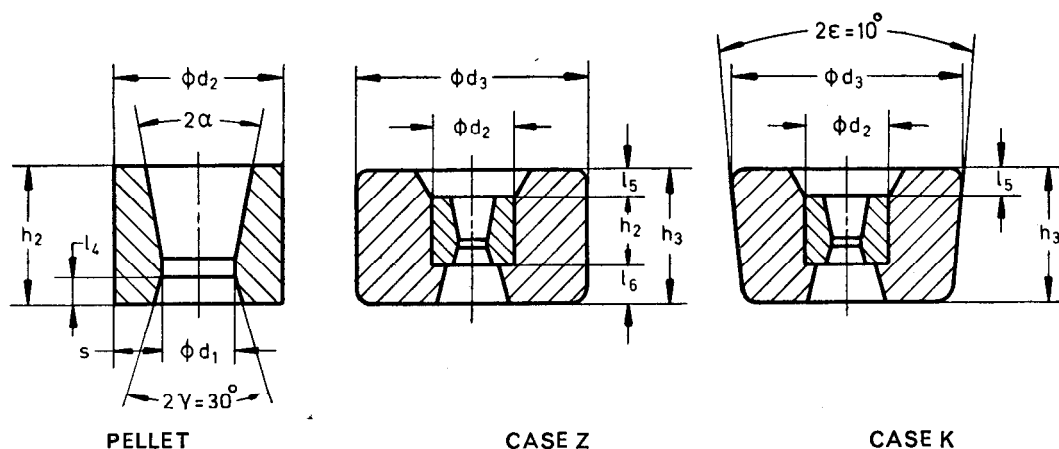| Pellet							Case					
d_2	h_2	d_1		s^*	l_4†		d_3	h_3	l_5		l_6‡	
		Min	Max	Min	Min	Max			Min	Max	Min	Max
25	20	9	12	6·5	2·0	4·0	75	40			11	15
30	24	11	14	8·0	2·4	4·8	100	45	5	9	12	16
35		13	18	8·5								
40	24	17	21	9·5	2·4	4·8	100	45			12	16
45	25	20	25	10·0	2·5	5·0	100	50	5	9	16	20
50		24	28	11·0			150					
55	27	27	32	11·5								
60		30	36	12·0	2·7	5·4	150	55	5	9	19	23
65		34	40	12·5								
70	30	38	44	13·0								
75		42	48	13·5	3·0	6·0	150	60	5	9	21	25
80		46	52	14·0			200					
85		50	56	14·5								
90	33	54	60	15·0	3·3	6·6	200	65	5	9	3	27
95		58	64	15·5								
100	35	62	68	16·0	3·5	7·0	200	65	5	9	21	25
105		65	72	16.5			250					

Note 1 — d_{1Min} = Minimum and preferable diameter of bearing at the first application.

Note 2 — d_{1Max} = Maximum diameter of bearing which is recommended for drawing non-ferrous metal bars having a tensile strength up to 800 MPa in the drawn condition with a drawing angle 2° (up to and including 25°).

Note 3 — Dies for drawing non-ferrous metal bars with d_{1Max} exceeding 72 mm are outside the scope of this Standard.

Note 4 — The diameter of bearing d_1 required by the user shall be chosen within the limits d_{1Max} and d_{1Min} except when the drawing angle 2α exceeds 25°. If the drawing angle is considerably smaller than 25°, the dimension d_{1Max} can be increased by up to 1 mm. The tolerance of bearing shall be specified by the user.

Note 5 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\varepsilon = 10°$ shall be provided, in which event d_3 is the diameter of the larger end of the taper.

Note 6 — For use on multiple draw benches a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50 and 55 mm and a case diameter d_3 of 175 mm for pellet diameter d_2 of 80 mm.

$*s_{Min} = \dfrac{d_2 - d_{1Max}}{2}$.

$†l_4 = 0·1$ up to $0·2\, h_2$.

‡Only for information.

4.4 *Dimensions for Tube Drawing Dies for Steel (Code-Letter* E *) and Tube Drawing Dies for Non-ferrous Metal (Code-Letter* F *)*

PELLET: ϕd_2, 2α, h_2, l_4, s, ϕd_1, $2\gamma = 30°$

CASE Z: ϕd_3, ϕd_2, l_5, h_2, h_3, l_6

CASE K: $2\epsilon = 10°$, ϕd_3, ϕd_2, l_5, h_3

PELLET   CASE Z   CASE K

All dimensions in millimetres.

Pellet							Case					
d_2	h_2	d_1		$s*$	l_4†		d_3	h_3	l_5		l_6‡	
		Min	Max	Min	Min	Max			Min	Max	Min	Max
25	20	10	12	6·5	2·0	4·0	75	40			11	15
30		11	14	8·0			100	45	5	9	12	16
35	24	13	18	8·5	2·4	4·8						
40	24	17	22	9·0	2·4	4·8	100	45			12	16
45		21	26	9·5					5	9	16	20
50	25	24	30	10·0	2·5	5·0	150	50				
55		28	34	10·5								
60	27	32	38	11·0	2·7	5·4	150	55	5	9	19	23
65		36	42	11·5								
70		40	45				150	60	5	9	21	25
75	30	43	50	12·5	3·0	6·0						
80		48	55				200					
85		53	58	13·5			200	65	5	9	23	27
90	33	56	62	14·0	3·3	6·6						
95		60	67									
100		65	70	15·0	3·5	7·0	200	65	5	9	21	25
105	35	68	75									
110	38	73	78	16·0	3·8	7·6	250	70			23	27
120	38	74	88	16·0	3·8	7·6	250	70			23	27
130		84	97	16·5								
140	40	93	106	17·0	4·0	8·0	300	75	5	9	26	30
150		102	115	17·5								

Note 1 — d_{1Min} = minimum and preferable diameter of bearing at the first application.

Note 2 — d_{1Max} = maximum diameter of bearing which is recommended for drawing steel tubes having tensile strength up to 900 MPa and for drawing non-ferrous tubes having a tensile strength up to 800 MPa in the drawn condition with a drawing angle 2α up to and including 40°.

Note 3 — Dies for drawing steel tubes with d_{1Max} exceeding 115 mm are outside the scope of this standard.

Note 4 — The diameter of bearing d_1 required by the user shall be chosen within the limits d_{1Min} and d_{1Max} except when the drawing angle 2α exceeds 40°. If the drawing angle 2α is considerably smaller than 40°, d_{1Max} may be increased by up to one millimetre. The tolerance of bearing shall be specified by the user.

Note 5 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\epsilon = 10°$ shall be provided, in which event d_3 is the diameter of larger end of the taper.
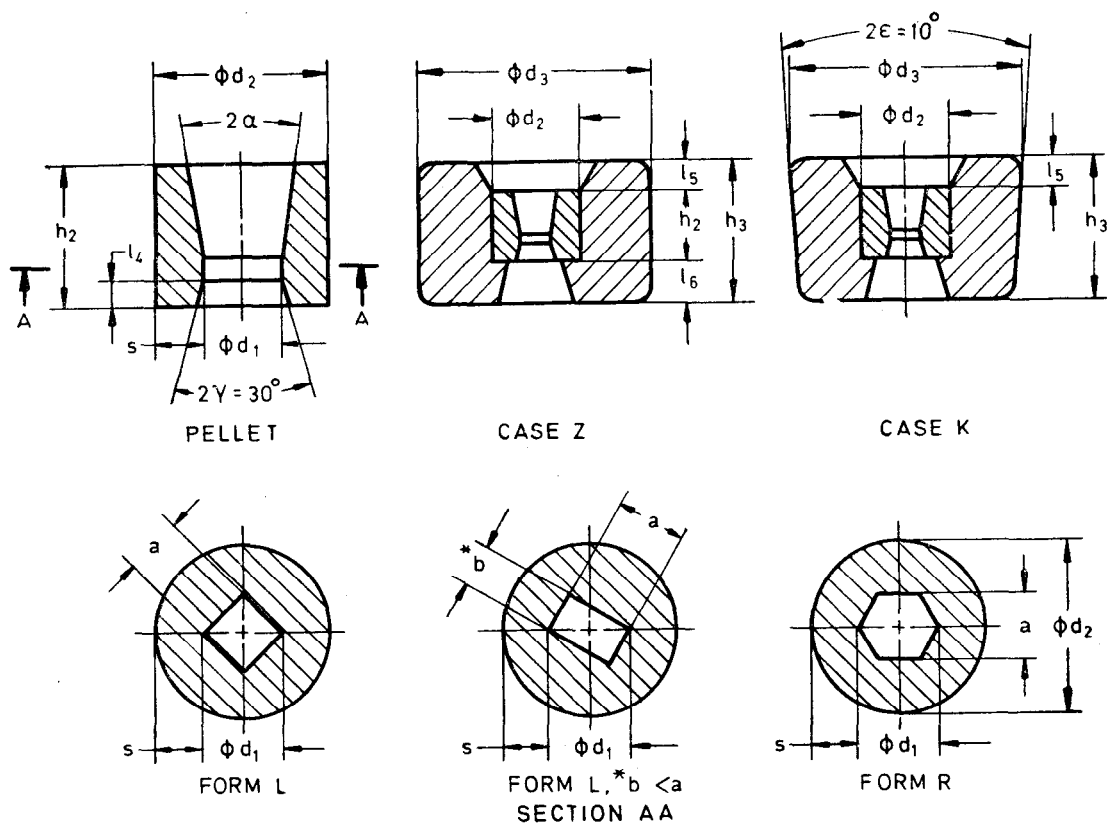
Note 6 — For use on multiple draw benches, a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55, 60 and 65 mm and a case diameter d_3 of 175 mm pellet diameters d_2 of 80, 85, 90, 95 and 100 mm.

$$*s_{Min} = \frac{d_2 = d_{1Max}}{2} \cdot$$

†l_4 = 0·1 up to 0·2 h_2.

‡Only for information.

4.5 *Dimensions for Shaped Drawing Dies for Steel of Square and Flat Section (Code-Letter L) and Hexagon Bar Drawing Dies for Steel (Code-Letter R)*

PELLET CASE Z CASE K

FORM L FORM L, *b <a FORM R
SECTION AA

All dimensions in millimetres.

Pellet										Case						
		Form L			Form R			l_4‡					l_5		l_6§	
d_2	h_2	a		s†	a		s†			d_3	h_3					
		Min	Max	Min	Min	Max	Min	Min	Max			Min	Max	Min	Max	
16	13	1	5	4·45	1	5	5·10	1·3	2·6	43	25	4	—	—	8
20	17	4	6	5·75	4	7	5·95	1·7	3·4	43	32	5	—	—	10
25	20	5	7	7·50	6	9	7·30	2·0	4·0	75	40	5	9	11	15
30		6	9	8·65	8	11	8·65								
35	24	8	11	9·70	10	13	10·00	2·4	4·8	100	45	5	9	12	16
40		10	13	10·80	12	16	10·75								
45	25	12	15	11·90	15	19	11·55	2·5	5·0	100	50	5	9	16	20
50		14	18	12·25	18	21	12·90								
55	27	17	20	13·35	20	24	13·85	2·7	5·4	100	55			19	23
60	27	19	22	14·45	23	27	14·40			100					
65		21	24	15·55	26	29	15·75	2·7	5·4	150	55	5	9	19	23
70	30	23	27	15·90	28	32	16·55	3·0	6·0		60			21	25
75	30	26	29	17·00	31	35	17·30			150	60	5	9	21	25
80		28	31	18·10	34	37	18·65	3·0	6·0	200					
85	33	30	33	19·15	36	40	19·40	3·3	6·6	150	65			23	27
90	33	32	35	20·25	39	43	20·15	3·3	6·6	200	65			23	27
100	35	36	40	21·70	42	48	22·30	3·5	7·0	200	65	5	9	21	25

†$s_{Min} = \dfrac{d_2 - d_{1Max}}{2}$.

‡$l_4 = 0{\cdot}1$ up to $0{\cdot}2\ h_2$.

§Only for information.

Note 1 — a_{Min} = minimum and preferable bore dimension at the first application.

Note 2 — a_{Max} = maximum bore dimension which is recommended for shaped drawing dies for steel of square and flat section and hexagon bar drawing dies for steel having a tensile strength up to 900 MPa in the drawn condition with a drawing angle 2α up to and including 20°.
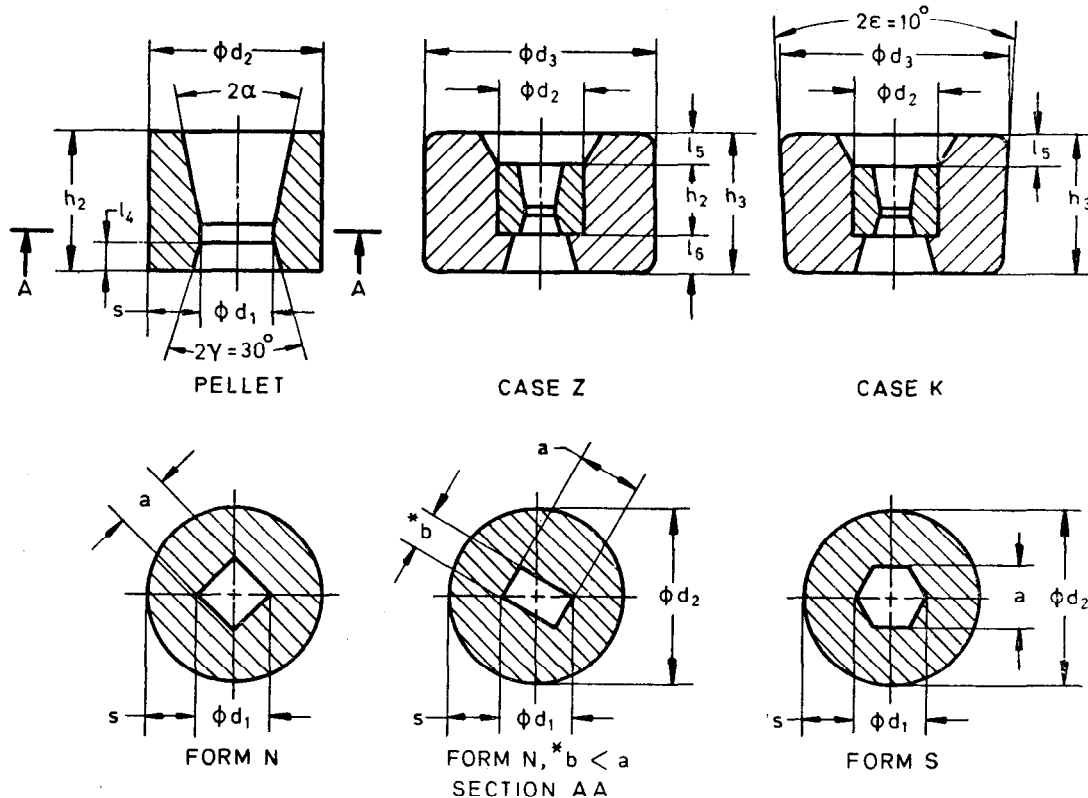
Note 3 — Shaped drawing dies for steel of square and flat section, the dimensions a of which exceed 40 mm, and hexagon bar drawing dies for steel, the dimension a of which exceed 48 mm, are outside the scope of this standard.

Note 4 — The bore dimensions a required by the user should be chosen within the limits a_{Max} and a_{Min} except when the drawing angle 2α exceeds 20°. The tolerance of bearing shall be specified by the user.

Note 5 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\varepsilon = 10°$ shall be provided, in which event d_3 is the diameter of the larger end of the taper.

Note 6 — For use on multiple draw benches, a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55 and 60 mm and a case diameter d_3 of 175 mm for pellet diameters d_2 of 80 and 55 mm.

4.6 Dimensions for Shaped Drawing Dies for Non-ferrous Metal of Square and Flat Sections (Code-Letter N) and Hexagon Bar Drawing Dies for Non-ferrous Metal (Code-Letter S)

PELLET   CASE Z   CASE K

FORM N   FORM N, *b < a   FORM S

SECTION A A

All dimensions in millimetres.

		Pellet								Case					
		Form N			Form S			l_4‡							
d_2	h_2	a		s†	a		s†			d_3	h_3	l_5		l_6§	
		Min	Max	Min	Min	Max	Min	Min	Max			Min	Max	Min	Max
16	13	1	5	4·45	1	5	5·10	1·3	2·6	43	25	4	—	—	8
20	17	4	7	5·05	4	7	5·95	1·7	3·4		32	5	—	—	10
25	20	6	8	6·85	6	10	6·75	2·0	4·0	75	40	5	9	11	15
30	24	7	10	7·95	9	12	8·10	2·4	4·8	100	45	5	6	12	16
35		9	12	9·00	11	15	8·85								
40		11	14	10·10	14	18	9·60								
45	25	13	17	10·50	17	21	10·40	2·5	5·0	100	50	5	9	16	20
50		16	19	11·55	20	24	11·15								
55	27	18	22	11·95	23	27	11·90	2·7	5·4	150	55			19	23
60	27	21	25	12·30	26	31	12·10								
65		24	28	12·70	29	34	12·90	2·7	5·4	150	55	5	9	19	23
70	30	27	31	13·10	32	38	13·10	3·0	6·0		60			21	25
75	30	30	33	14·15	36	41	13·85	3·0	6·0	150	60	5	9	21	25
80		32	36	14·55	39	43	15·15			200	65				
85	33	34	38	15·60	41	45	16·50	3·3	6·6					23	27
90	33	36	41	16·00	43	48	17·30	3·3	6·6	200	65	5	9	23	27
100	35	39	45	18·20	46	53	19·40	3·5	7·0					21	25

†$s_{Min} = \dfrac{d_2 - d_{1Max}}{2}$.

‡$l_4 = 0·1$ up to $0·2\ h_2$.

§Only for information.

Note 1 — a_{Min} = minimum and preferable bore dimensions at the first application.

Note 2 — a_{Max} = maximum bore dimensions which is recommended for shaped drawing dies for non-ferrous metal of square and flat section and hexagon bar drawing dies for non-ferrous metal having a tensile strength up to 600 MPa in the drawn condition with a drawing angle 2α up to and including 25°.

Note 3 — Shaped drawing dies for non-ferrous metal of square and flat section, the dimensions a of which exceed 45 mm, and hexagon bar drawing dies for non-ferrous metal, the dimensions a of which exceed 53 mm, are outside the scope of this Standard.

Note 4 — The bore dimension a required by the user should be chosen within the limits a_{Max} and a_{Min} except where the drawing angle 2α exceeds 25°. The tolerance of bearing shall be specified by the user.

Note 5 — The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\varepsilon = 10°$ shall be provided, in which event d_3 is the diameter of the larger end of the taper.

Note 6 — For use on multiple draw benches a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55 and 60 mm and a case diameter d_3 of 175 mm for pellet diameter d_2 of 80 and 85 mm.

5. Material

5.1 *Pellet* — Hard metal (carbide).

5.2 *Case*

For dies using acid free lubricants	:	Steel having tensile strength not less than 600 MPa
For dies using acidic lubricants	:	Brass having tensile strength between 580 to 630 MPa
For dies using acidic lubricants and wire of high tensile strength	:	Bronze having tensile strength between 700 to 950 MPa

6. General Requirements

6.1 The pellet shall be positively and permanently fixed in its correct position in the case. The method of fixing shall be such that adequate support is provided to the peripheral face and the base of the pellet.

6.2 All surfaces of the pellet bore shall be free from scratches and irregularities, other than those naturally inherent in the finishing process.

7. Sampling — The sampling and criteria of acceptance shall be in accordance with IS : 7778-1975 ' Methods for sampling small tools '.

8. Designation — Shall be designated by the name, code-letter of die, code-letter of shape of case, diameter of pellet, diameter of case, diameter of bearing, drawing angle and the number of this standard.

Example 1:

A drawing die for steel wire (A) of cylindrical shape (Z) having diameter of pellet $d_2 = 14$ mm, diameter of case $d_3 = 28$ mm, diameter of bearing $d_1 = 3.5$ mm, drawing angle $2\alpha^* = 16°$, case made of steel (St) and conforming to this standard, shall be designated as:

Die AZ 14 × 28 × 3·5 × 16° IS : 4918-St

When the case is made of brass (Bs) or bronze (Bz), the letters 'St' in the designation shall be replaced by 'Bs' or 'Bz' as appropriate.

Example 2:

A drawing die for non-ferrous metal bars (D), of conical shape (K) having diameter of pellet $d_2 = 25$ mm, diameter of case $d_3 = 75$ mm, diameter of bearing $d_1 = 9$ mm, radius of the generator circle of the toric surface, $R†$, case made of steel (St) and conforming to this standard, shall be designated as:

Die DK 25 × 75 × 9 × 99 × R IS : 4918-St

When the case is made of brass (Bs) or bronze (Bz), the letters 'St' in the designation shall be replaced by 'Bs' or 'Bz' as appropriate.

---

*Where the bore profile is not specified, the user must specify the details of the material to be drawn together with the method of drawing.

†To replace the conical surface of the top angle 2α by a toric surface, angle 2α in the designation shall be replaced by the symbol '99' accompanied by the radius value, in millimetres, of the generator circle of the toric surface.

Example 3:

A drawing die for non-ferrous metal of square and flat section (N), of cylindrical shape (Z) having diameter of pellet $d_2 = 45$ mm, diameter of case $d_3 = 100$ mm, boring section $a \times b = 15 \times 15$ mm, drawing angle $2\alpha = 20°$, case made of steel (St) and conforming to this standard, shall be designated as:

Die DZ 45 × 100 × 15 × 15 × 20° IS : 4918

When the case is made of brass (Bs) or bronze (Bz), the letters 'St' in the designation shall be replaced by 'Bs' or 'Bz' as appropriate.
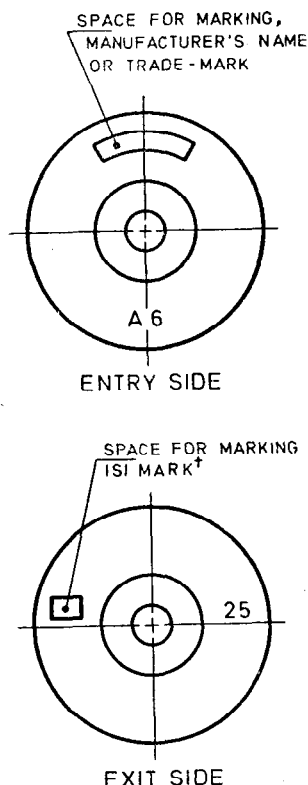
9. Marking

9.1 Wire, bar and tube drawing dies conforming to this standard shall be marked with the following details on their cases, as indicated in the figure below:

9.1.1 *On the entry side:*

    a) Short designation of the type of die (*see* **2.1**),

    b) Diameter of bearing d_1; and

    c) Manufacturer's name or trade-mark.

9.1.2 *On the exit side*:

    a) Diameter of pellet, d_2; and

    b) ISI mark†.

SPACE FOR MARKING,
MANUFACTURER'S NAME
OR TRADE-MARK

A 6

ENTRY SIDE

SPACE FOR MARKING
ISI MARK†

25

EXIT SIDE

9.2 *ISI Certification Marking* — Details available with the Indian Standards Institution.

10. Protective Coating and Packing

10.1 Each die shall be coated suitably for rust proofing and wrapped in a non-absorbent paper protected by a cover indicating the diameter of bearing, diameter of pellet and manufacturer's name or trade-mark.

10.2 Dies of one size only shall be packed in a carton.

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†In case the die is certified by the Indian Standards Institution.

APPENDIX A

(*Clause* 1.1)

COMPARISON OF THE DIMENSIONS OF BEARING AND BORE FOR VARIOUS TYPES OF DRAWING DIES

A-1. Comparison — (Figures are same as under **4.2, 4.3, 4.4, 4.5** and **4.6**)

All dimensions in millimetres.

d_2	h_2	Dies with Code-letter C		Dies with Code-letter D		Dies with Code-letter E/F		Dies with Code-letter L		Dies with Code-letter R		Dies with Code-letter N		Dies with Code-letter S	
		$2\alpha = 20°$ Max		$2\alpha = 25°$ Max		$2\alpha = 40°$ Max		$2\alpha = 20°$ Max		$2\alpha = 25°$ Max		$2\alpha = 25°$ Max		$2\alpha = 25°$ Max	
		d_1 Max	d_1 Min	d_1* Max	d_1 Min	d_1* Max	d_1 Min	a Max	a Min	a Max	a Min	a Max	a Min	a Max	a Min
16	13	—	—	—	—	—	—	5 (7·1)	1 (1·4)	5 (5·8)	1 (1·2)	5 (7·1)	1 (1·4)	5 (5·8)	1 (1·2)
20	17	—	—	—	—	—	—	6 (8·5)	4 (5·7)	7 (8·1)	4 (4·6)	7 (9·9)	4 (5·7)	7 (8·1)	4 (4·6)
25	20	—	—	12	9	12	10	7 (9·9)	5 (7·1)	9 (10·4)	6 (6·9)	8 (11·3)	6 (8·5)	10 (11·5)	6 (6·8)
30	24	13	9	14	11	11	11	9 (12·7)	6 (8·5)	11 (12·7)	8 (9·2)	10 (14·1)	7 (9·9)	12 (13·8)	9 (10·4)
35	24	16	12	18	13	18	13	11 (15·6)	8 11·3	13 (15·0)	10 (11·5)	12 (17·0)	9 (12·7)	15 (17·3)	11 (12·7)
40	24	19	15	21	17	22	17	13 (18·4)	10 (14·1)	16 (18·5)	12 (13·8)	14 (19·8)	11 (15·6)	18 (20·8)	14 (16·2)
45	25	22	18	25	20	26	21	15 (21·2)	12 (17·0)	19 (21·9)	15 (17·3)	17 (24·0)	13 (18·4)	21 (24 2)	17 (19·5)
50	25	25	21	28	24	30	24	18 (25·5)	14 (19·8)	21 (24·2)	18 (20·8)	19 (26·9)	16 (22·7)	24 (27·7)	20 (23·1)
55	27	28	24	32	27	34	28	20 (28·3)	17 (24·0)	24 (27·7)	20 (23·1)	22 (31·1)	18 (25·5)	27 (31·2)	23 (26·6)
60	27	31	27	36	30	38	32	22 (31·1)	19 (26·9)	27 (31·2)	23 (26·6)	25 (35·4)	21 (29·7)	31 (35·8)	26 (30·0)
65	27	34	29	40	34	42	36	24 (33·9)	21 (29·7)	29 (33·5)	26 (30·0)	28 (39·6)	24 (33·9)	34 (39·2)	29 (33·5)
70	30	37	32	44	38	45	40	27 (38·2)	23 (32·5)	32 (36·9)	28 (32·3)	31 (43·8)	27 (38·2)	38 (43·8)	32 (36·9)
75	30	41	35	48	42	50	43	29 (41·0)	26 (36·8)	35 (40·4)	31 (45·8)	33 (46·7)	30 (42·4)	41 (47·3)	36 (41·6)
80	30	45	39	52	46	55	48	31 (43·8)	28 (39·6)	37 (42·7)	04 (89·2)	36 (50·9)	32 (45·3)	43 (49·7)	39 (45·0)
85	33	49	43	56	50	58	53	33 (46·7)	30 (42·4)	40 (46·2)	33 (41·6)	38 (53·8)	34 (48·2)	45 (52·0)	41 (47·3)
90	33	53	47	60	54	62	56	35 (49·5)	32 (45·4)	43 (49·7)	39 (45·0)	41 (58·0)	36 (50·9)	48 (55·4)	43 (49·7)
95	33	—	—	64	58	67	60	—	—	—	—	—	—	—	—
100	35	61	51	68	62	70	65	40 (56·6)	36 (50·9)	48 (55·4)	42 (48·5)	45 (63·6)	39 (55·2)	53 (61·2)	46 (53·1)
105	35	—	—	72	65	75	68	—	—	—	—	—	—	—	—
110	38	—	—	—	—	78	73	—	—	—	—	—	—	—	—
120	38	—	—	—	—	88	74	—	—	—	—	—	—	—	—
130	40	—	—	—	—	97	84	—	—	—	—	—	—	—	—
140	40	—	—	—	—	106	93	—	—	—	—	—	—	—	—
150	40	—	—	—	—	115	102	—	—	—	—	—	—	—	—

Note — The values in brackets for the dies with code-letters L, N, R and S correspond to the diagonal sizes based on the exact calculation.

*If the drawing angle 2α lies considerably under 25° (dies with code-letter D) and 40° (dies with code-letters E and F), d_1 maximum can be increased up to one millimetre.

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EXPLANATORY NOTE

This standard was first published in 1968. This revision is being undertaken to bring it in line with the work done at ISO level. In this revision dies for bars and tubes and also the sectional dies have been included.

In the preparation of this standard considerable assistance has been derived from ISO 1684-1975 'Wire, bar and tube drawing dies — Specifications' issued by International Organization for Standardization.

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